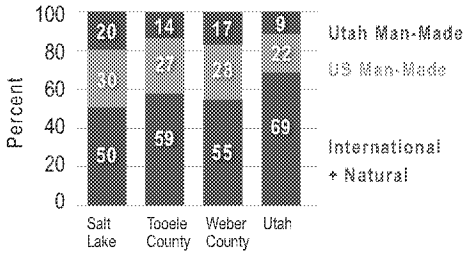
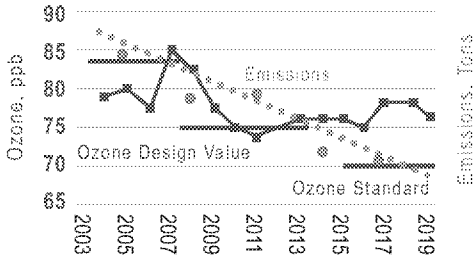
Wasatch Front Ozone: A "179B" Demonstration of International Emissions Influence Reduces Requirements for Additional Costly and Ineffective Controls

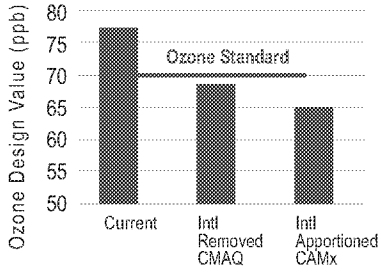
- EPA designated the Wasatch Front as Marginal nonattainment for the 2015 ozone air quality standard.
- An EPA study indicates more than 50% of local ozone originates from international and natural emission sources (Figure 1).
- Utah man-made emissions make < 20% of local ozone; Utah can only control <50% of this amount.
- Despite reductions in ozone precursor emissions – nitrogen oxides (NOx) and volatile organic compounds (VOC) – ozone remains above the standard (Figure 2).
- Preliminary model results show that "but for" international emissions, the Wasatch Front would meet the ozone standard (Figures 3,4).



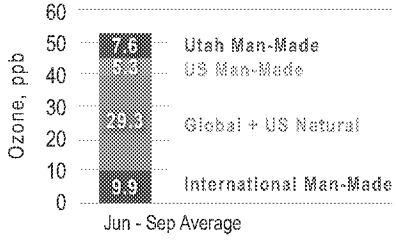
1 *Figure 1. EPA Ozone Source Apportionment in Wasatch Front: < 20% Controllable in Utah*



2 *Figure 2. Trends: Wasatch Front Ozone with VOC + NOx Emissions; Emissions Down 37% without Ozone Improvement*



3 *Figure 3. Current Monitored Ozone and Modeled Ozone without International Man-Made Contributions*



4 *Figure 4. Modeled Summer-Average Ozone Contributuons at Bountiful Viewmont Monitor Site*

Table 1. Comparison of Nonattainment Options

	Option 1	Option 2
	Submit 179B Demonstration No Later Than August 2021 ("Retrospective")	"Bump-Up" to Moderate and Submit 179B Demonstration After Bump-Up ("Prospective")
Procedural	• Conduct additional modeling to show international emissions influence. • Describe supporting evidence.	• Prepare a State Implementation Plan (SIP). • Demonstrate VOC emissions reductions of 15%. • Prepare RACT analysis for VOC and NOx. • Show inability to develop attainment demonstration. • Conduct additional modeling to show international emissions influence. • Describe supporting evidence.
Challenges	• DAQ may need additional resources. • Model requires input from EPA and/or more resources. • EPA has some approval discretion. • 179B due to EPA no later than August 2021.	• Longer period of regulatory uncertainty. • Higher nonattainment classification discourages growth. • UDAQ Air Board reviews RACT determination. • EPA has approval discretion. • More controls could be needed for 15% VOC and RACT. • Requires higher air permit offset ratio. • 179B due to EPA no later than August 2024.
Benefits	• Establishes certainty by 1Q2022. • Provides time to realize Tier 3 fuels and engines benefit. • State can tailor air quality enhancements appropriately. • Establishes most favorable position for economic growth.	• Allows more time to develop 179B.
Recommendation	• Encourage DAQ to develop a 179B demonstration ***now*** and avoid bump-up to Moderate. Provide resources as needed. • If done prior to bump-up, the 179B demonstration eliminates any requirement for additional ineffective costly controls dictated by EPA, providing DAQ the time and flexibility to improve air quality through state-tailored solutions. • Developing the 179B now allows time to fully realize the benefits of Tier 3 fuels and engines.	

Wasatch Front Ozone: A "179B" Demonstration of International Emissions Influence Reduces Requirements for Additional Costly and Ineffective Controls

EPA designated the Wasatch Front as Marginal nonattainment for the 2015 ozone air quality standard.[1] Ozone is formed in the ambient air from the reaction of nitrogen oxide (NOx) and volatile organic compound (VOC) emissions. The federal Clean Air Act prescribes requirements for States to address nonattainment areas.

The State has little opportunity to reduce local ozone due to the amount produced in other states, internationally, from natural sources, and from federally regulated motor vehicles. An EPA study shows less than 20% of the ozone in the Wasatch Front results from in-state anthropogenic (man-made) sources (Figure 1).[2] The small fraction of locally generated VOC and NOx emissions include 65% from mobile sources[3] over which the state has no control, 30% from difficult-to-control area sources,[4] and only 15% from electric generating and industry sources.[5] A significant amount of Wasatch Front ozone is transported in from international sources. Considering extensive controls already implemented for $PM_{2.5}$ (fine particulate matter less than 2.5 microns in size) and its precursors including VOC and NOx (ozone precursors) additional controls will be costly and will not reduce ozone.

Despite large decreases in Wasatch Front emissions and the success in improving ambient $PM_{2.5}$, ambient ozone has not improved in over 15 years (Figure 2).[6]

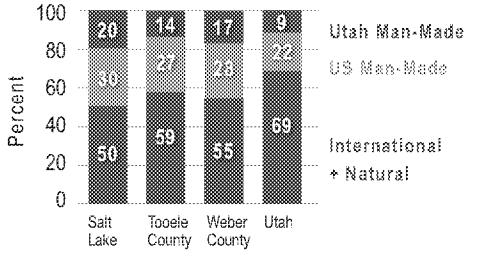


Figure 1. EPA Ozone Source Apportionment in Wasatch Front: < 20% Controllable in Utah

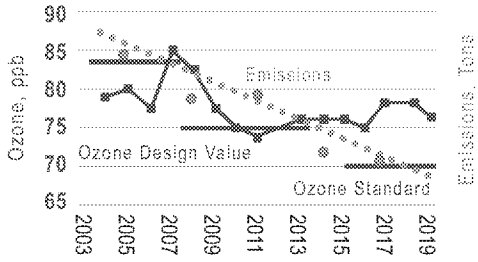
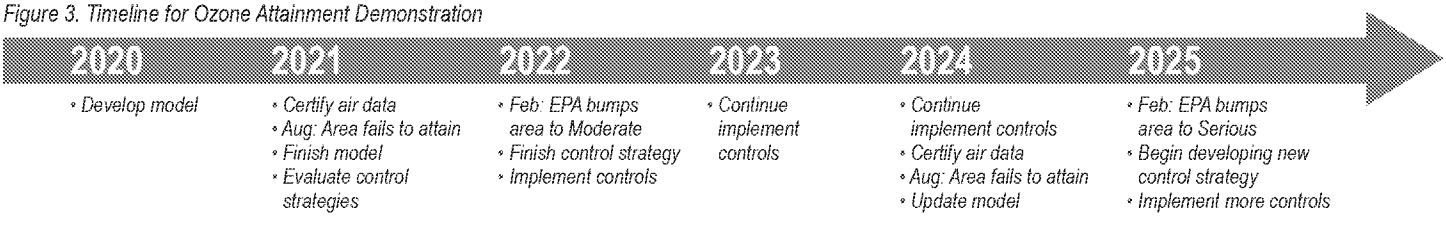


Figure 2. Trends: Wasatch Front Ozone with VOC + NOx Emissions; Emissions Down 37% without Ozone Improvement

Figure 3. Timeline for Ozone Attainment Demonstration



The Wasatch Front must attain the ozone standard based on three calendar years of ambient air quality monitoring data, 2018 through 2020. If it fails to attain, EPA will "bump it up" to Moderate nonattainment in 2022 unless Utah requests and receives relief under established provisions of the Clean Air Act (discussed below). The Clean Air Act requires Moderate nonattainment areas to reduce VOC emissions by 15% compared to the 2017 baseline level, implement Reasonably Available Control Technology (RACT), **and additional controls as needed to demonstrate achieving attainment** (Figure 3). Emission reductions from controls for $PM_{2.5}$ implemented before January 1, 2018 will not count toward the required 15% reduction.Thus, unless granted an exemption, the Wasatch Front will almost certainly be bumped up to Moderate status and could be required to install costly controls that will be ineffective in reducing ozone levels. Furthermore, if it fails to attain at Moderate based on 2021 to 2023 data, it will bump to Serious and must potentially implement even more ineffective controls. Considering the emission controls already installed, very little more can be done to affect emissions in 2021 to 2023 other than motor vehicle fleet turnover, which may yield smaller reductions than in prior years because EPA recently relaxed motor vehicle fuel economy emission standards.[7,8]

Figure 4. Timeline for 179B International Emissions Demonstration at Marginal

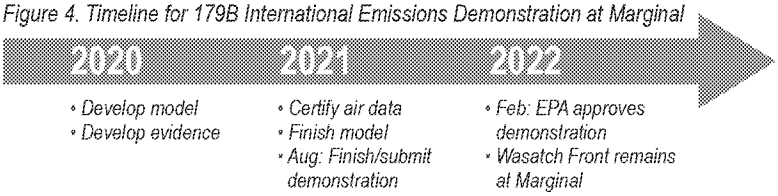
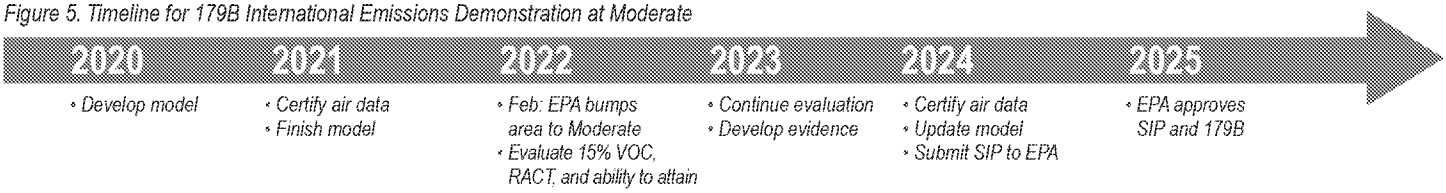


Figure 5. Timeline for 179B International Emissions Demonstration at Moderate



The Clean Air Act provides a common-sense opportunity for an area impacted by international ozone to avoid imposing costly controls that will provide little benefit. The State could develop a "179B" demonstration shoing that the Wasatch Front would attain the standard "but for" the local impact of international emissions. If submitted at the Marginal nonattainment level and EPA approves the demonstration, the area would remain at Marginal and would not be required to install costly but ineffective controls (Figure 4). EPA calls this a "retrospective demonstration". This option allows seeing the full benefits of Tier 3 fuels and engines before considering more controls.

Alternatively, the State could allow EPA to bump-up the area to Moderate nonattainment and then develop the 179B demonstration. If submitted at the Moderate level and EPA approves the demonstration, the area would remain at Moderate. EPA calls this a "prospective demonstration". The State would need to evaluate current controls compared to other Clean Air Act requirements, which could lead to additional required costly but ineffective emission controls, i.e. a 15% reduction in VOC emissions from January 1, 2018 forward and RACT. While controls already established for the $PM_{2.5}$ State Implementation Plan (SIP) may address these requirements fully or partly, a requirement to install new controls remains uncertain in part because both the Utah Air Board and EPA have approval discretion (Figure 5).

In a preliminary analysis to assess the contribution of global international ozone transport to the Wasatch Front, two state-of-the-science photochemical models were applied using consistent meteorology and emissions inputs.[9] One model directly simulated the effect of removing contributions from international transport and assessed the resulting ozone impact. The other model tracked the separate emission contributions to total ozone from Utah, the rest of the US, and international sources. EPA's draft 179B guidance describes both approaches[10] which also follow EPA's standardized methods used in SIP to demonstrate future attainment of air quality standards.[11]

Following EPA's SIP recommendations, modeled contributions from international sources were used to scale the area's current ozone "design value"[12] to project what they would be in the hypothetical absence of international transport. As additional weight of evidence, absolute modeled international contributions were compared to the ozone reduction needed to attain the standard at the limiting monitoring site.

Results from both models projected design values in the absence of international contributions well less than the ozone standard at all monitoring sites and exceed the necessary reduction by 2 to 7 ppb (2-10% of the 70 ppb standard) at the highest, limiting monitoring site (Figure 6). According to the second approach (absolute reductions needed to attain), summer-average international contributions at the highest design value site (78 ppb at Bountiful Viewmont) ranged from 6.7 to 9.9 ppb among the two models, compared to a 7.1 ppb reduction needed to attain the standard. Figure 7 shows summer-averaged source apportionment results for Bountiful Viewmont ambient air monitoring site. Therefore, the two models bracket the needed absolute design value reduction, consistent with results recently reported by EPA in 2019.[13]

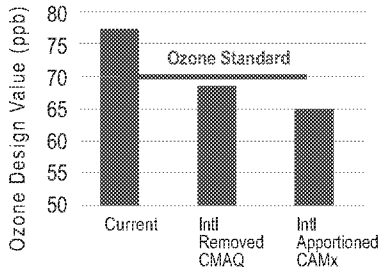


Figure 6. Current Monitored Ozone and Modeled Ozone without International Man-Made Contributions

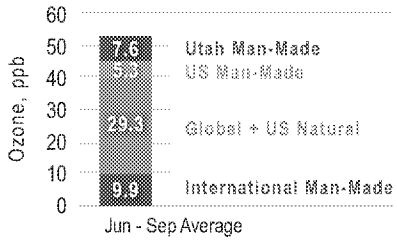


Figure 7. Modeled Summer-Average Ozone Contributuons at Bountiful Viewmont Monitor Site

1 The Northern Wasatch Front ozone nonattainment area includes Salt Lake and Davis Counties and portions of Tooele and Weber Counties. The Southern Wasatch Front ozone nonattainment area includes part of Utah County.
2 Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone, White Paper for Discussion", December 30, 2015, EPA website at https://www.epa.gov/ground-level-ozone-pollution/background-ozone-workshop-and-information.
3 Mobile sources include both on-road (cars and trucks) and off-road (construction, rail, air, etc.).
4 Area sources include residential sources and population-based sources such as gas stations, dry cleaners, restaurants, auto-body shops, etc.
5 Based on Utah Division of Air Quality published emission inventories for the counties represented in the Wasatch Front ozone nonattainment areas, 2017 data, located at https://deq.utah.gov/air-quality/statewide-emissions-inventories.
6 $PM_{2.5}$ precursors include NOx, VOC, sulfur dioxide (SO2), and ammonia. Thus, $PM_{2.5}$ controls addressed emissions from all four precursors plus $PM_{2.5}$ emitted directly such as from wood and coal burning and some industrial sources.
7 "The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks", Federal Register, Volume 85, Number 84, April 30, 2020, p. 24174.
8 Future emission reductions due to motor vehicle fleet turnover will be smaller than in the past. The EPA model to estimate vehicle emissions relies on 2014 motor vehicle standards and has not been updated to reflect current Administration rollbacks of vehicle emission standards.
9 Modeling employed EPA's 2016 national modeling platform developed for the Community Multiscale Air Quality (CMAQ) model and the Comprehensive Air Quality Model with extensions (CAMx). https://www.epa.gov/air-emissions-modeling/emissions-modeling-platforms.
10 "Draft Guidance on the Preparation of Clean Air Act Section 179B Demonstrations for Nonattainment Areas Affected by International Transport of Emissions (EPA-457/P-20-001). https://www.epa.gov/sites/production/files/2020-01/documents/draft_179b_guidance-final_draft_for_posting.pdf
11 "Modeling Guidance for Demonstrating Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze" (EPA 454/R-18-009). https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.
12 Average of three calendar years of annual 4th-high monitored ozone data
13 Transboundary Air Pollution, Briefing for Clean Air Act Advisory Committee; November 7, 2019; EPA website at https://www.epa.gov/sites/production/files/2019-11/documents/international_transport_.pdf